

**DUODENAL ULCER PERFORATION IN  
BUNDELKHAND REGION-  
A RETROSPECTIVE & PROSPECTIVE STUDY**

**THESIS**

**FOR**

**MASTER OF SURGERY  
(GENERAL SURGERY)**



**BUNDELKHAND UNIVERSITY  
JHANSI (U.P.)**

**2004**

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# DEPARTMENT OF SURGERY

M.L.B. Medical College, Jhansi

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## CERTIFICATE

This is to certify that the work entitled "DUODENAL ULCER PERFORATION IN BUNDELKHAND REGION – A RETROSPECTIVE & PROSPECTIVE STUDY" has been carried out by Dr. Mohit Kumar Joshi personally in the Department of Surgery, M. L. B Medical College, Jhansi, under my guidance and supervision.

The techniques described were undertaken by the candidate himself and the observations recorded have been periodically checked by us.

He has completed the required stay in the department and has fulfilled the conditions required for the submission of thesis according to University regulations.

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# DEPARTMENT OF SURGERY

M.L.B. Medical College, Jhansi

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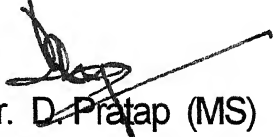
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## **ACKNOWLEDGEMENT**

*"O my God, to Him I pray  
Increase my knowledge day by day"*

After this little prayer to Almighty, I extend my utmost, heart felt acknowledgement to my respected teachers, who embody vast knowledge and experience and perform the task of God by imparting knowledge to us and moulding our future.

One is confronted with a great difficulty when words find themselves unable to express what one feels in the depth of heart.

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*In last but not the least, I am thankful to those patients who were the case material for this study for their kind co-operation.*

DATE :

  
MOHIT KUMAR JOSHI

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# INTRODUCTION

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# **INTRODUCTION**

Peptic ulcers are most often solitary chronic lesions that occur at any level of GI tract exposed to aggressive action of acid peptic juices or a decrease in the mucosal resistance.

An ulcer is defined as a persistent discontinuity of an epithelial surface that can occur in skin or mucus membrane. Peptic ulcers are so common in industrialized nation that they virtually represent stigma of civilization.

Perforation is one of the most catastrophic complications of peptic ulcer. In spite of modern advances in surgical, anaesthetic and ancillary facilities, it still assumes life-threatening dimensions. Prompt recognition of the condition is of paramount importance, as only by early diagnosis and treatment it is possible to reduce the still relatively high mortality.

Approximately 98-99% of peptic ulcers either in duodenum or in stomach in ratio of 4:1. Duodenal ulcer is the most common ulcer in the GI tract. Free perforation into the peritoneal cavity occurs in 2-3%. Perforation of duodenal ulcer is an emergency condition, which requires immediate surgical intervention. Peptic ulcers are remitting and relapsing lesions that are often diagnosed in middle aged to older adults (45 yrs. and above). 5-10% of



patients have no recognizable prior ulcer symptoms and may appear after a period of weeks to months of active disease and heal with or without therapy. Thus it is difficult to express accurate data about frequency of active disease. The best estimate of peptic ulcer frequency is from autopsy studies and surveys of patients indicate a range of 6.14% for men and 2.6% for women. Perforation is one of the most dramatic complication of duodenal ulcer and perforated duodenal ulcer is most common perforation of upper GI tract. Ulcer that perforates mostly present on anterior aspect of first part of duodenum, rarely an ulcer is present in posterior wall and perforates in lesser sac and adjacent structures, most often in pancreas, less commonly into liver, biliary tract or colon.

It is silent chronic ulcer that perforates specially in patients who are being treated with steroids, usually symptoms of perforation occur with dramatic suddenness.

After perforation duodenal contents escape through the perforation into general peritoneal cavity resulting into the peritoneal reaction (Peritonism). Peritoneum reacts to this chemical irritation by secreting peritoneal perforation fluid copiously, which dilutes the contents, and this gives relief of pain

for short time. This stage lasts for 3-6 hrs and is followed by diffused bacterial peritonitis.

Bacterial peritonitis develops late as there is sufficient acid from the stomach. If this condition is not treated immediately, the course is fatal. Patients die because of septicemia and peripheral vascular failure.

If early treatment is instituted in form of surgical closure of perforation, through peritoneal lavage I.V. fluids and parenteral antibiotics, mortality is low. Various methods have been adopted for closure of perforated duodenal ulcer from time to time and superiority of method is judged in terms of incidence of post operative leakage. The options available for closure of perforated duodenal ulcer include simple closure, Cellan Jones closure, closure by falciform ligament and Graham's closure.

The present study deals with the:

1. Age distribution
2. Sex distribution
3. H/O smoking and its duration
4. Prior drug intake and its duration – NSAIDS, steroids.
5. Psychological factors (stress/anxiety)
6. Family history

- 
7. History suggestive of chronic gastric/ duodenal ulcer,  
Diabetes, Hypertension
  8. Symptoms
  9. Clinical signs elicited
  10. Radiological features
    - X-Ray abdomen findings
    - USG findings
  11. Procedure performed
    - Surgical
    - Conservative
  12. Total hospital stay
  13. Post operative Complications
    - Fever
    - Wound sepsis
    - Wound dehiscence
    - Leakage/duodenal fistula
  14. Other complications
    - GOO
    - Pulmonary
    - Cardiovascular
    - Renal
  15. Mortality

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**MATERIAL**  
**AND**  
**METHODS**

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# **MATERIAL AND METHODS**

The present study was conducted on patients with clinical diagnosis of perforation of chronic peptic duodenal ulcer presenting emergency ward of MLB Medical College, Jhansi in Department of Surgery from Dec 2001 to May 2003 and also a retrospective study of 3 yrs. (from May 1998 to Nov 2001)

Following plan of work was followed: -

1. Preoperative work up (Clinical and biochemical)

A. Evaluation and analysis of symptoms in order to find out duration of perforation and incidence of each symptom: -

- Pain in abdomen
- Fever
- Absolute constipation
- Vomiting
- Distension of abdomen

B. Past history in order to find out high risk cases and incidence of acid peptic disease.

- Diabetes Mellitus
- Hypertension
- Pulmonary disease

- Drug intake like NSAIDS & steroids
- History suggestive of acid peptic disease

C. Presence/absence of psychological factors (stress, anxiety)

D. Family history

E. General examination and systemic examination in order to assess general condition of patient suitable for anesthesia and surgery.

- General condition
- Blood pressure (mm Hg)
- Pulse rate (per min)
- Respiratory rate (Per min)
- Anemia
- Jaundice
- Urine output
- Cardiovascular examination
- Respiratory examination

F. Local examination of abdomen to make clinical diagnosis and analysis of signs in order to evaluate incidence of each sign: -

- Board like rigidity
- Tenderness

- Guarding
- Distension of abdomen
- Masking of liver dullness

#### G. Investigations

- Hemogram – Hb, TLC, DLC
- Renal functions
  - a. B. Urea (mg%)
  - b. S. Creatinine (mg%)
- S. Electrolytes
  - a. S. Na<sup>+</sup> (Meq/L)
  - b. S. K<sup>+</sup> (Meq/L)
- Radiology
- Plain X-ray abdomen erect A.P. view including both lobes of diaphragm
- USG findings

All patients were resuscitated with

- Intravenous fluids
- Appropriate antibiotics
- Nasogastric decompression by Ryles tube.
- Catheterization

2. Pre-operative work up: -

All of the patients were operated under general anesthesia and preferable incision was midline.

During operation following points were recorded.

- 1.) Size of perforation diameter
- 2.) Site of perforation
- 3.) Surrounding wall of duodenum
- 4.) Condition of omentum
- 5.) Any additional finding on exploration

The peritoneal soiling was cleared by peritoneal lavage and lavage fluid was suctioned out, the definitive procedure then performed.

3. Post operative work up: -

- IV Fluids
- IV antibiotics
- Active Ryles tube suction
- Assessment of vitals viz. Blood pressure, Pulse rate, Respiratory rate, Urine output.
- Assessment of abdomen to see board like rigidity, guarding.

Postoperative patients were kept nil orally along with Ryles tube aspiration till bowel sounds were heard and flatus appreciated by the patient. Drains were taken out according to the amount of



drainage. Ryles tube was removed after 3-5 days. Patients were called up after 7 days, 15 days, 2 months and 6 months.

**Advice on discharge**

1. To avoid
  - Smoking
  - NSAIDS
  - Steroids
2. Proton Pump blockers for 14 days
3. Eradication of H. Pylori infection
4. Antacids for 8 weeks
5. Follow up after 6 weeks.

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**REVIEW**  
**OF**  
**LITERATURE**

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## **REVIEW OF LITERATURE**

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Peptic perforation is the most serious and important complication of gastroduodenal ulceration. The earliest mention of duodenal ulcer in the medical literature is in the London 'Medico-Chisurgical Transaction' of 1817. Mr. Travers there reports 2 cases of perforated duodenal ulcer.

In the second edition of 'Pathological and practical research on disease of the stomach by Dr. John Abercrombie five cases stored in literature are collected together.

The first clear description is usually attributed to Cruveilhier (1829) whose name it bore for many years as the round ulcer of Cruveilhier but Methew Baillie pictured the lesion in a series of engravings published in 1829. The first paper specially devoted to this subject appeared in 1861, it dealt solely with perforating ulcer and notes were given of cases collected from literature.

In 1894 H.P. Dean recorded the first successful case of perforating ulcer treated by operation, LA Dun followed him. The results of these two cases drew conspicuous attention to the subject, and other success quickly followed. Wair gave an

excellent summary of the early cases, together with a critical review of the whole subject of perforating duodenal ulcer in his presidential address to the American Surgical Association.

Rosenow (1921) in Mayo Clinic produced peptic ulceration in rabbits by the intravenous injection of streptococci from human ulcers. Ivy (1920) produced similar results by injection of sterile broth. Braithwaite (1923) suggested a lymphatic infection. Seley and Colp (1941) have proved the presence of pathogens in peptic ulcer perforation.

Cushing's (1932) neurogenic theory in the causation of peptic ulcer is well documented. Mc Carrison (1924) has observed that the incidence of peptic ulcer is 50 times higher in south India than in North India. In 1936, it was pointed out by Mc Carrison, Somervell, and Orr that dietetic factors were of paramount importance in causation of peptic ulcer. Diets poor in protein and vitamins A, B and C and fat have all been blamed.

Recently smoking has erupted up as an important etiological factor in the causation of peptic ulcer. In 1947 Jamieson et al studied the smoking habits of 437 cases of perforated peptic ulcer and concluded that heavy smoking was associated with severe

symptoms. A carefully controlled study by Doll et al (1958) showed that smoking could be a factor in the production of peptic ulcer. Gastric secretion is stimulated by smoking has been proved by Gray 1930, Crohn (1938), Chrenfeld and Stutevart (1941) and Steigmenn, (1954).

Dodds and his associates (1934) produced chronic ulcer with perforation by oral and subcutaneous administration of pituitarin in rabbits, which produces mucosal ischemia by spasm. Mann and Williamson (1923) showed if the duodenal contents were diverted to the ileum and the jejunum exposed to undiluted gastric juice a typical chronic peptic ulcer developed almost invariably, proving the importance of hyperacidity in the causation of peptic ulcer.

Genetic influences are important in predisposition to duodenal ulcer, which are as follows:

- i) Duodenal ulcer is about three times more common in first-degree relations of ulcer patient than in general population.
- ii) A 50% concordance for duodenal ulcer has been observed in monozygotic twins as compared with 14% in dizygotic twins.

- iii) Individuals of blood group 'O' are about 37% more likely to develop duodenal ulcer than those with other blood groups.
- iv) An increase incidence of HLA b-5 antigens also has been identified in white males with duodenal ulcer.
- v) The genetic trait with pepsinogen hypersecretion segregated as an autosomal dominant trait is hailed as a marker for predisposition to duodenal ulcers.

Duodenal ulcer is more frequent in patients with alcoholic cirrhosis, chronic renal failure and hyperparathyroidism. In general, duodenal ulcer patients have higher mean basal acid output and maximal acid output than do normal controls and significantly higher levels than present in patients with gastric ulcer.

There is evidence linking the recently isolated organism 'Helicobacter pylori'<sup>20, 53</sup>. H Pylori has been isolated from the gastric mucosa in 90% of patients with duodenal ulcers, 70% with gastric ulcers and 60% with non-ulcer dyspepsia (Marshall et al, 1985). The pathogenic role of H. pylori has yet to be confirmed, current evidence suggests that this organism is probably one of

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the several contributory factors in pathogenesis of peptic ulceration.

Treatment of peptic duodenal perforation by aspiration of the stomach was first employed by Wangesteen in patients too ill to withstand operation. However, it was Mullen who first used the method deliberately in ordinary uncomplicated cases. In 1939 Mullen presented in surgical society of scuttle a report on 8 cases treated in this way without fatality. As a result the method was used elsewhere, perhaps rather prematurely, and three deaths occurred in 27 patients, a mortality of 11%. Although one of these 3 cases was hopeless when first seen<sup>40, 41, 44</sup>.

In England the first report of the deliberate treatment of uncomplicated perforated ulcer by gastric aspiration was by Bedford Turner in 1945. He described 6 cases that he treated without a death, while he was resident at the Royal Sussex Country Hospital<sup>43</sup>.

Taylor (1946, 1957)<sup>50-51</sup> has been strong proponent of non-operative treatment for perforated duodenal ulcer. Seeley et al (1965) also reported success with non-operative treatment and depended primarily on nasogastric suction and spontaneous

sealing of perforation. Most surgeons in United States had little enthusiasm for non-operative treatment in all such patients. Using the strict selection criteria (< 24 hours duration of perforated peptic ulcer and stable haemodynamic condition), Kean et al (1988)<sup>50</sup> successfully treated 81% of the 42 patients (complication occurred in 14%).

However, Brene and Donovan (1989) reported success with non-operative treatment in selected cases of perforated duodenal ulcer. An earlier report from the surgical department of University of Southern California stated that only 40% patients out of 350 cases had sealed perforated ulcer at the time of hospital admission as determined by gastroduodenogram using diatrizoate meglumine (Hypaque). Unsealing was infrequent in their experience. Some of the patients responded excellently on conservative regimen using nasogastric suction, parenteral fluids and antibiotics. However if abdominal finding did not improve within 6 hours, operative treatment was advised. Donovan recommended surgeons to adopt non-operative treatment in patients whose operative risk is excessive. He also commented that patients over 70 years age are



less likely to respond to non-operative treatment and should have an urgent operative repair of perforation<sup>39,41</sup>.

Still most of the authors point that non-operative is not the treatment of choice for healthy individuals nor it can be expected to save the lives of severely ill patients who are literally dead when first seen. Non-operative treatment can, therefore, benefit in occasional patient but the identification of such a patient is difficult and requires a prospective study stratified according to the risk factors.

### **Operative Treatment**

At present management of perforated duodenal ulcer is mostly surgical. In 1983 Edward Crisp reported 50 patients of acid peptic diseases and described clinical course of those with peptic ulcer perforation. He also suggested possibility of operative closure of perforation.

Mikulicz made earliest attempt of surgical closure of perforated duodenal ulcer in 1884 but this remained unsuccessful. Kriege closed a perforated duodenal ulcer successfully surgically for the first time in 1892. Subsequently Dean also reported another successful case in 1894.

Most widely used therapeutic options today are Graham's omentopexy<sup>13</sup>. The Graham's omentopexy of a perforated duodenal ulcer is a time tested procedure and in an otherwise healthy subject carries a very low mortality rate in small sized perforation (<1 cm.). Moreover, it is simple enough to be done by a trainee surgeon without being under direct supervision. Since perforation of a duodenal ulcer presents as an emergency at odd hours, Graham's omentopexy has another reason to be an attractive option. Results of the Graham's omentopexy have been almost uniformly good with low mortality rate. Another commonly used method is simple closure its mortality rate varying from 2-18% in most of the recent studies. Sawyer in a study of 254 patients treated by simple closure reported a mortality of 6.7% and mortality of 21%. Boey et al<sup>28</sup> in 1982 in a prospective, randomised double blind trial observed no deaths among 35 patients of perforated duodenal ulcer treated with simple closure. Panda et al, (1976) reported a mortality of 13.4% among 246 patients treated with simple closure where as Kohli et al (1988) observed 4 deaths in 43 cases<sup>39</sup>.

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Adarzi et al (1993) used laparoscopic omental patch repair of perforated duodenal ulcer with an automated stapler. Laparoscopic omental patch repair followed by administration of H<sub>2</sub> antagonists was performed successfully in 11 patients with perforated peptic ulcer by Masao Matsuda et al (1995)<sup>44</sup>. Since 2/3<sup>rd</sup> of the patients continue to have ulcer symptoms and more than 1/3<sup>rd</sup> after simple closure of perforated duodenal ulcer. So interest has increased in performing a definitive procedure in emergency to control ulcer diasthesis in addition to closure of perforation, but with the advent of proton pump inhibitors (PPI) in 1960 definitive procedures are no longer being carried out. This is because of more effective medical management using PPI's which can make a patient virtually achlorhydric<sup>15</sup>. Moynihan recommended closure of perforation in 1901 and later Finsterer (1919) urged the use of partial gastrectomy. The first large experience with definitive operation of perforated duodenal ulcer was treated by immediate gastric resection with mortality of 8.9 percent.

Further support to the advocates of definitive surgery was given by Debaquey's initial report in 1940 and subsequent report from Jordon (1979)<sup>22,23,24,25</sup> demonstrating that resection can be

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performed with a mortality rate of only 1%. Sawyer's<sup>42</sup> in a study of 106 patients who underwent definitive operation at the time of perforation observed a mortality of only 2.8% and morbidity of 15%. Jordon and Debaeky<sup>43</sup> in their total experience of 327 patients who underwent immediate gastrectomy observed an overall mortality of 2.1% whereas the overall surgical mortality rate for hemigastrectomy and vagotomy was 2.5%. Recurrence rate in this series was 73%, 69% and 0% for those treated with simple closure, gastrectomy (Bitroth I or II) and hemigastrectomy and vagotomy respectively. But all these reports had selection bias in favour of definitive surgery by excluding high-risk group from definitive surgery. Boey and colleagues<sup>28,31</sup> reported the first prospective, controlled, randomized trial of immediate definitive surgery versus closure in 1982. Demiguel (1982) and Jordon & Thornby (1987)<sup>21</sup> obtained excellent results of elective treatment of duodenal ulcer by partial cell vagotomy, it was logic to evaluate this treatment for perforated duodenal ulcer. First study to compare proximal gastric vagotomy (PGV)<sup>43</sup> with truncal vagotomy & pyloroplasty was conducted by Boey and coworkers. Caeneviva et al (1986)<sup>40</sup>

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compared PGT versus simple closure for perforated duodenal ulcer. The recurrence rates were 5% and 58% respectively.

Michael L Cheatham et al (1995) presented a 20 year report on a prospective study of omental patch closure and parietal cell vagotomy for treatment of perforated duodenal ulcer. This operation is an ideal procedure to cope with the immediate problem of perforation and simultaneously provide definite ulcer therapy in selected cases. Christine F Kollmorgen et al (1996)<sup>38</sup> compared open and laparoscopic vagotomy for efficacy of acid reduction and preservation of normal gastric emptying.

Boey (1987) evaluated risk factors for mortality as follows-  
15,18,46,

1. Presence of serious medical illness
2. Pre- operative shock
3. Long standing perforation (>24 hrs.).

When three risk factors were present, all patients died, with two risk factors mortality was 45.5%. However it decreased to 10% with only one risk factor. In absence of all these risk factor no patient died. The above data as reported by Boey's<sup>15</sup> support that presence of risk factors significantly influences the mortality.

Therefore only closure of perforated duodenal ulcer is advised instead of definitive procedure when any of risk factors is present. When there is no risk factor operative mortality is same as for definitive procedure. For closure of perforated duodenal ulcer various methods have been evolved from time to time. Their superiority is assessed in terms of post- operative leakage of perforated duodenal ulcer.

Surgical intervention in an emergency demands an operative technique, which combines speed and simplicity so that degree of shock already existing shall not be made more profound by prolonged anesthesia.

### **1. Simple Closure Technique**

Simple closure technique involves placement of multiple full thickness sutures, in long axis of duodenum across the perforation. At least two stitches must travel through perforated ulcer. These sutures are tied in such a manner to achieve perfect apposition of perforated margin with avoidance of inversion or eversion of margin. It is preferable to use synthetic monofilament absorbable suture such as polydioxanone (PDS). The absorption characteristics of these materials are more predictable than those

of Catgut and suture more easily than do woven synthetic absorbable suture.

### **DISADVANTAGES OF SIMPLE CLOSURE TECHNIQUE**

It is suitable only for smaller perforation, because when an attempt is made to approximate margins of large perforated duodenal ulcer, sutures bite away due to undue tension. This increases the incidence of post-operative leakage<sup>41,49</sup>.

It is not suitable even for smaller perforation in presence of edema and induration in surrounding duodenal wall. If fibrosis is present, it has to be excised before closure and excision makes the perforation larger, thereby it become less feasible to approximate perforated margin properly by simple closure only. In presence of oedema and induration sutures do not hold in duodenal wall and they bite away when an attempt is made to tie them.

Read and Thompson (1975) reported a high incidence of gastric outlet obstruction after simple closure of perforated duodenal ulcer. On other hand Playforth and Mc Mahon (1978) reported 3% incidence of gastric outlet obstruction after simple closure. This wide difference in the frequency of stenosis suggest

either some local variation in natural history of ulcer or more likely the effect of varying surgical techniques for closure of the perforation.

### Graham's omentopexy

In 1937 Graham Steel<sup>13</sup> described omentopexy technique as a rapid method for treatment of perforated duodenal ulcer, which is practiced widely.

When simple apposition is not possible because of induration and oedema then omentopexy technique is useful. In this technique three full thickness lembert sutures are placed across the perforation in long axis of duodenum. At least one stitch must run though the perforated ulcer. Stitches are placed approximately half an inch away from the margin of perforation. A tag of healthy omentum with adequate blood supply is drawn under these sutures and tied.

## **OMENTAL PATCH TECHNIQUE**

In 1929 Cellan Jones<sup>48</sup> proposed an identical technique for closure of perforated duodenal ulcer but he suggested use of free omental graft. This technique is seldom used as this is associated with very high incidence of post- operative leakage due to the



reason that omental graft tend to necrose because of lack of vascular supply.

### **Surgical option in large Duodenal Ulcer Perforation**

When the perforation is very large and is not suitable for emergency closure by any of the above described method than various types of pyloroplasty with vagotomy and gastroenterostomy recommended (Passos and Colleagues. 1986). Out of which Heinke-Mikulicz pyloroplasty and truincal vagotomy is most suitable as emergency procedure.

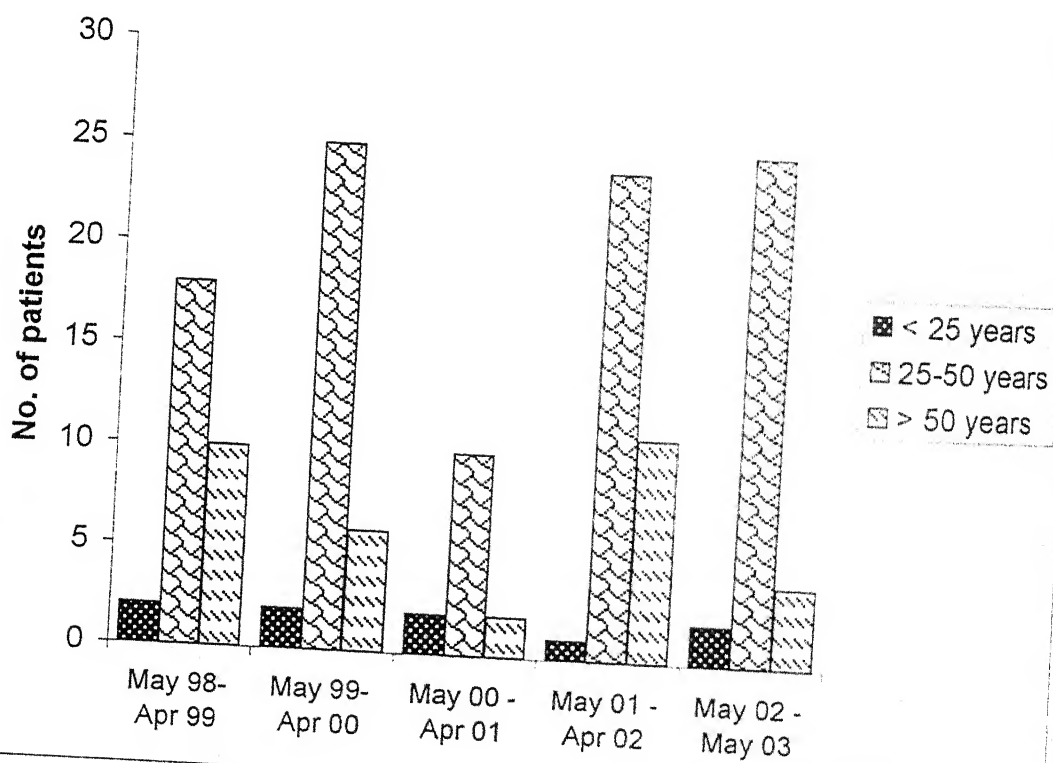
When Dragstedt introduced vagotomy in 1943, gastric acidity was effectively controlled in patients with duodenal ulcer but vagotomy leads to alteration in gastric tone and muscular activity and thus results in gastric stasis (Thomas 1957). Pyloroplasty alleviates this side effect of vagotomy and effectively facilitates the gastric emptying<sup>53</sup>.

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# OBSERVATION

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### Age incidence



# **OBSERVATION**

This five year retrospective and prospective clinical study (retrospective from May 98 to Nov 2001 and prospective from Dec 2001 to May 2003) of perforated duodenal ulcer in Bundelkhand region was done on admitted patients in the Department of surgery MLB Medical College, Jhansi. The total cases studied were 145.

All the cases were studied under following headings and findings were compared with studies done elsewhere in India and abroad.

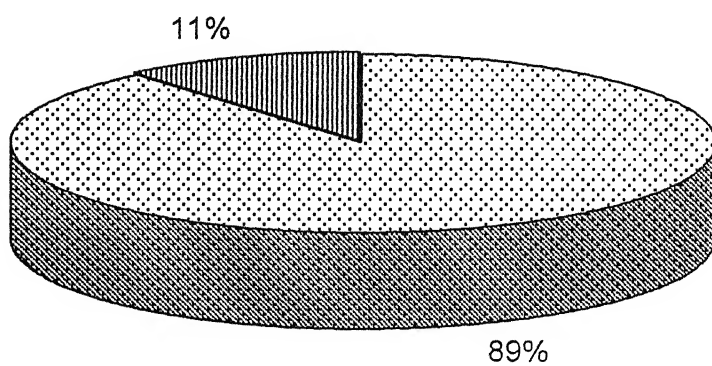
## **AGE INCIDENCE**

**TABLE-1**

Age groups	May 98 – Ap 99		May 99 – Ap 00		May 00 – Ap 01		May 01 – Ap 02		May 02 – May 03	
	n	%	n	%	n	%	n	%	n	%
<25 years	2	6.6%	2	6.06%	2	14.3%	2	5.4%	2	6.45%
25-50	18	60%	25	75.7%	10	71.4%	24	64.8%	25	80.6%
> 50 years	10	33.3%	6	18%	2	14.3%	11	29.7%	4	12.9%
Total	38		33		14		37		31	

- Majority of patients presented in their third and fourth decade of life.
- The highest incidence was between 25-50 years of age.

### Age incidence in females



▣ 25-50 years ▤ > 50 years

- Out of 145 cases, 108 cases (74.48%) presented in this age group.
- Only 10 patients were below 25 years of age.
- Remaining 27 cases (18.62%) fell in >50 years of age group.

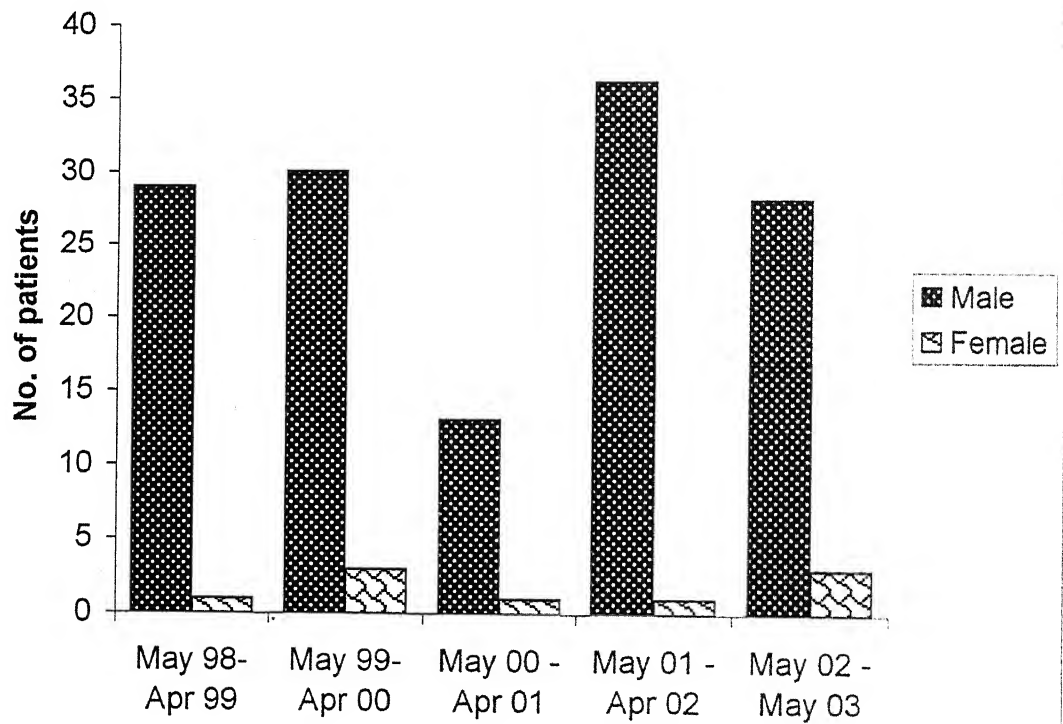
### **AGE INCIDENCE IN FEMALES**

**TABLE-2**

Age	No. of females effected (n=9)	Percentage
< 25 years	0	0
25-50 years	8	88.89
> 50 years	1	11.11
Total	9	100

Maximum effected females belong to 25 to 50 years of age group.

**Sex distribution**



## SEX DISTRIBUTION

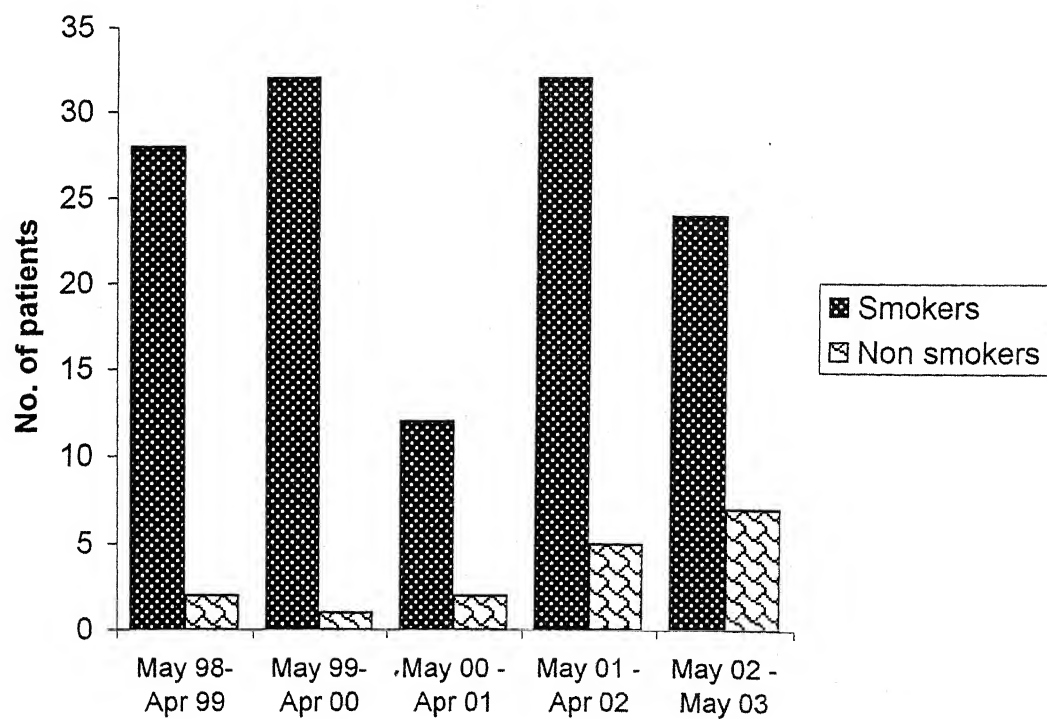
TABLE-3

Sex	May 98 – Ap 99		May 99 – Ap 00		May 00 – Ap 01		May 01 – Ap 02		May 02 – May 03	
	n	%	N	%	n	%	n	%	n	%
Male	29	96.6	30	90.9	13	92.8	36	97.2	28	90.33
Female	1	3.4	3	9.1	1	7.2	1	2.8	3	9.67
Total	30		33		14		37		31	

- In our study male was the main victim. Out of 145 cases 136 were male (92.41%) and only 9 were females (7.59%)



### History of smoking



## HISTORY OF SMOKING

TABLE-4

Duration	May 98 –		May 99 –		May 00 –		May 01 –		May 02 –	
	Ap 99		Ap 00		Ap 01		Ap 02		May 03	
	n	%	n	%	n	%	n	%	n	%
<b>Smokers</b>	28	93.4	32	96.9	12	85.7	32	86.4	24	77.4
<b>Non smokers</b>	2	6.6	1	3.1	2	14.3	5	13.6	7	22.5

- 90% of cases were smokers, majority of them smoked 1-2 bundles of bidis per day.
- Only 10% cases were non smokers.

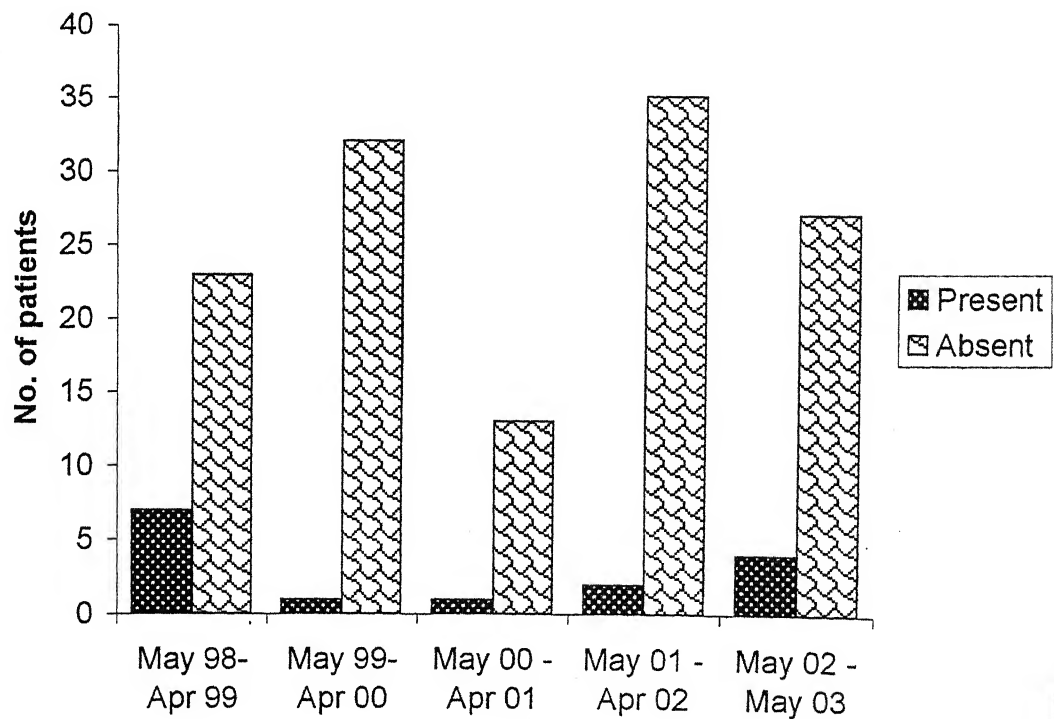
## **HISTORY OF SMOKING IN FEMALES**

**TABLE-5**

<b>History of smoking</b>	<b>No. of females effected (n=9)</b>	<b>Percentage</b>
<b>Smokers</b>	0	0
<b>Non smokers</b>	9	100
<b>Total</b>	<b>9</b>	<b>100</b>

Smoking was non existent among females in our study.

### History of NSAID/steroid intake



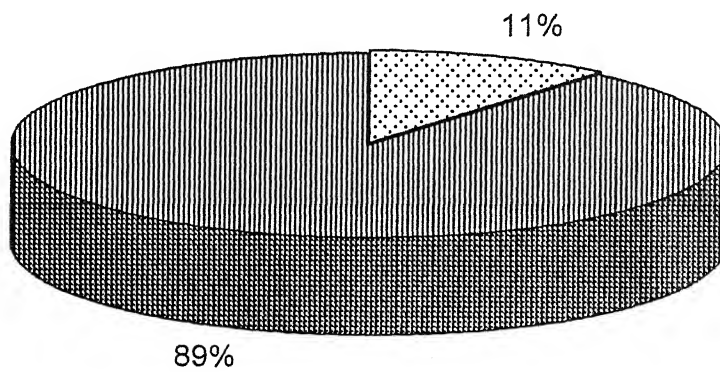
## HISTORY OF NSAID/STEROID INTAKE

TABLE-6

	May 98 – Ap 99		May 99 – Ap 00		May 00 – Ap 01		May 01 – Ap 02		May 02 – May 03	
	n	%	n	%	n	%	n	%	n	%
<b>Present</b>	7	23.4	1	3.1	1	7.2	2	5.4	4	12.9
<b>Absent</b>	23	76.6	32	98.9	13	92.8	35	94.6	27	87.1
<b>Total</b>	<b>30</b>		<b>33</b>		<b>14</b>		<b>37</b>		<b>31</b>	

- We found chronic history of drug intake in only 10% cases.

### NSAID/steroid intake in females



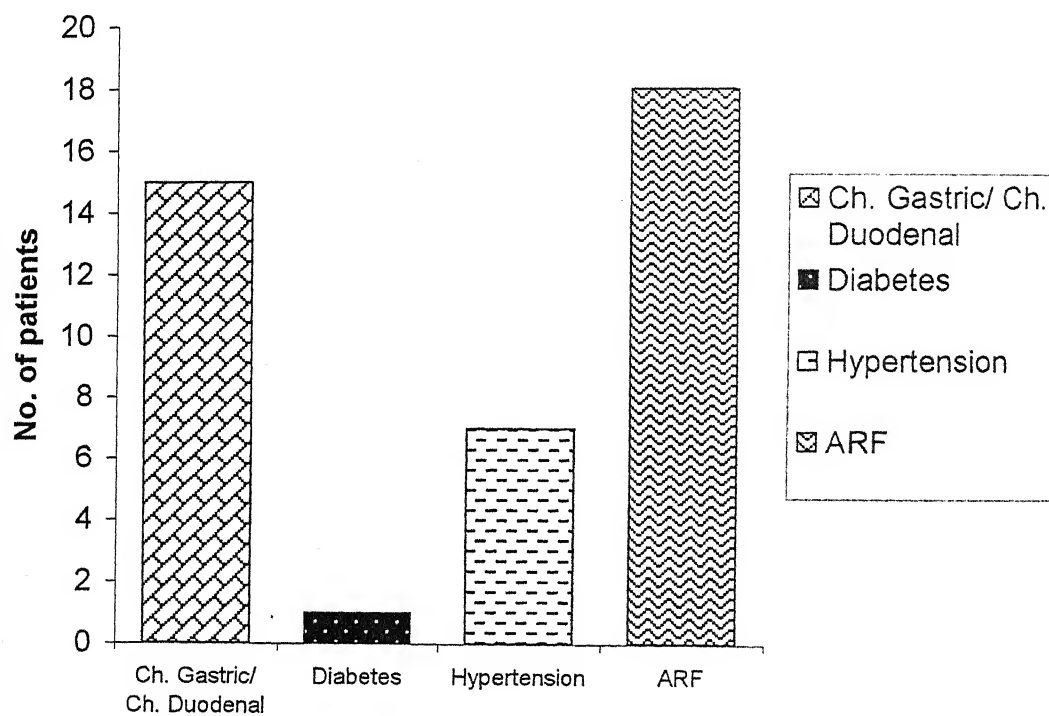
present Absent

**NSAID/STEROID INTAKE IN FEMALES****TABLE-7**

History of drug intake	No. of females effected	Percentage
Present	1	11.11
Absent	8	88.89
Total	9	100

In our study about 90% females had no history of drug intake.

### History of pre-existing diseases



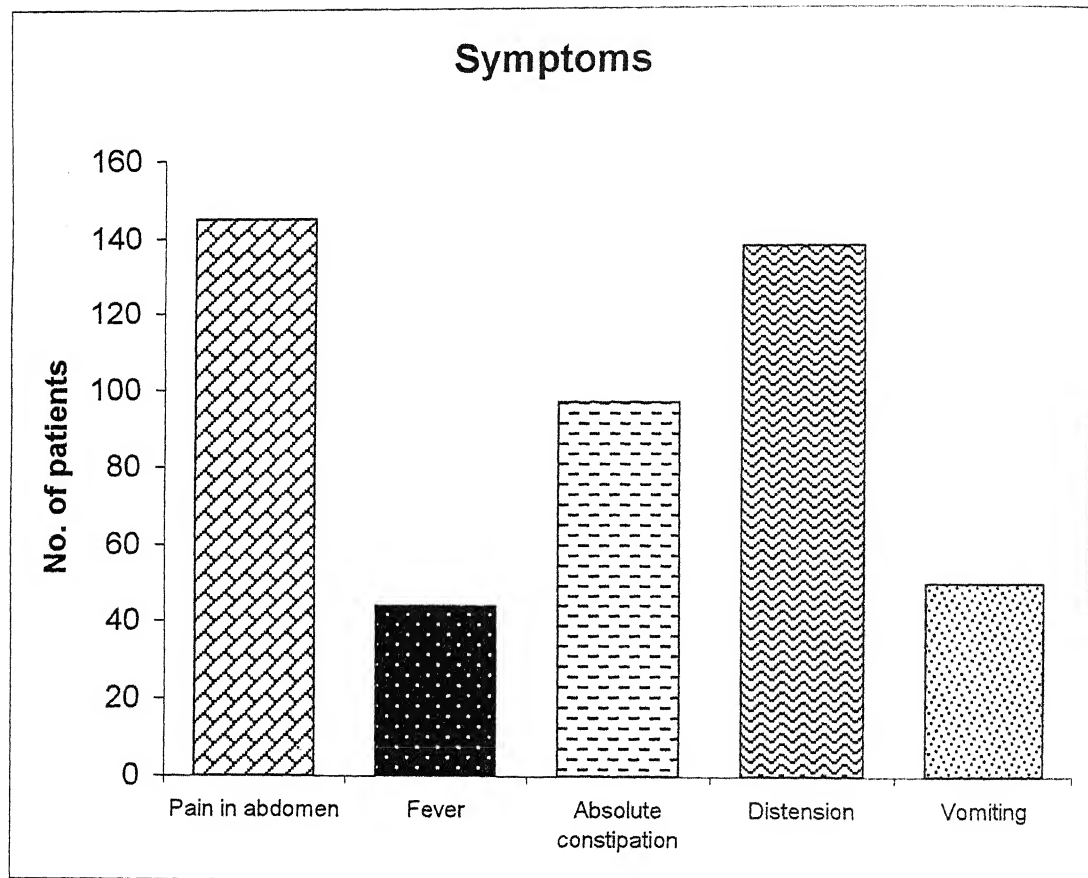


## HISTORY OF PRE-EXISTING DISEASES

**TABLE-8**

Pre-existing diseases	No. of patients	Percentage
History suggestive of chronic Gastric / chronic duodenal ulcer	15	10.34
Diabetes	1	0.68
Hypertension	7	4.82
ARF	18	12.41

- The past history of acid peptic disease (APD) was present in only 15 patients out of 145 patients (11.34%).
- 18 cases (12.41%) presented with ARF.
- 7 cases (4.82%) were hypertensive.

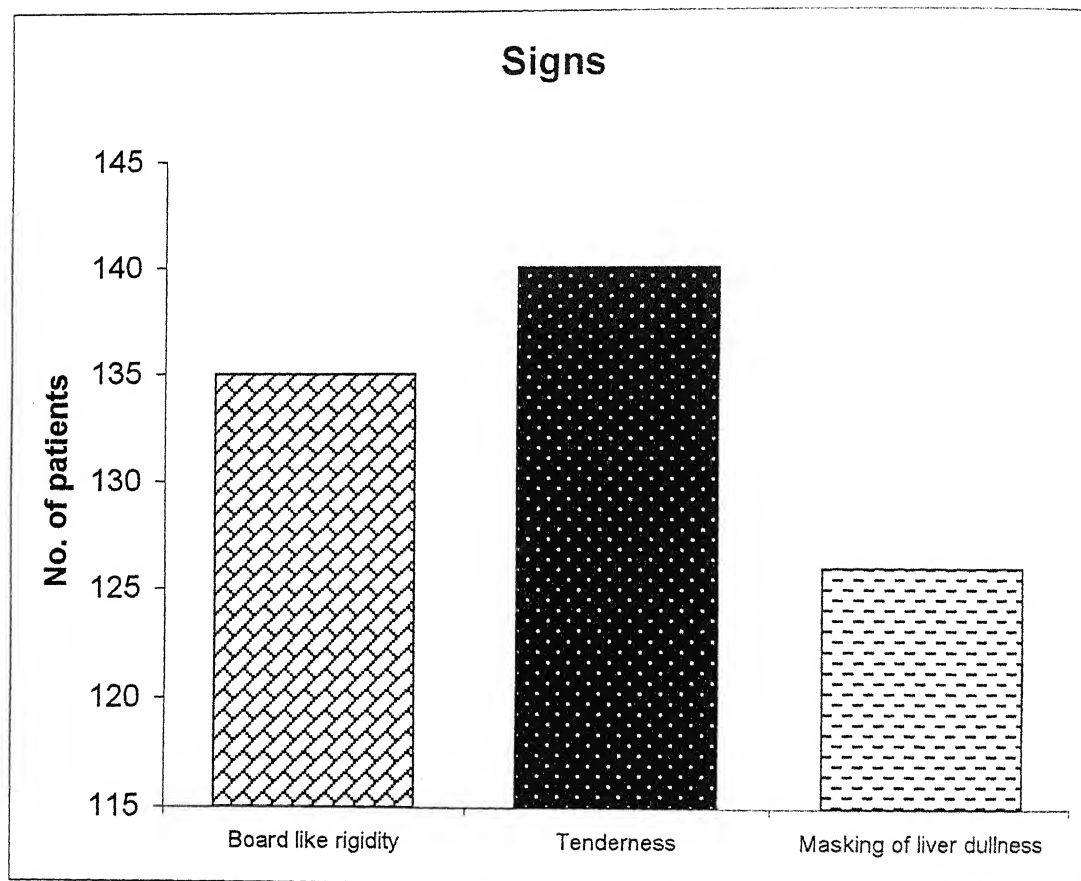


## **SYMPTOMS**

**TABLE-9**

<b>Symptoms</b>	<b>No. of patients</b>	<b>Percentage</b>
<b>Pain in abdomen</b>	145	100
<b>Fever</b>	44	30.39
<b>Absolute Constipation</b>	97	87.89
<b>Distension</b>	138	95.17
<b>Vomiting</b>	50	33.44

- In our study the most common presenting symptoms were distention of abdomen (95.17%) and absolute constipation (87.89%) and pain in abdomen (100%).
- Other presenting symptoms were fever (30.39%) and vomiting (33.44%).



**SIGNS****TABLE-10**

<b>Signs</b>	<b>No. of patients</b>	<b>Percentage</b>
<b>Board like Rigidity</b>	135	97.89
<b>Tenderness</b>	140	99.1
<b>Shifting dullness</b>	Nil	0
<b>Masking of liver dullness</b>	126	87.58

- Almost 100% patients had generalized abdominal tenderness and board like rigidity.
- Masking of liver dullness was present in 87.58% cases.

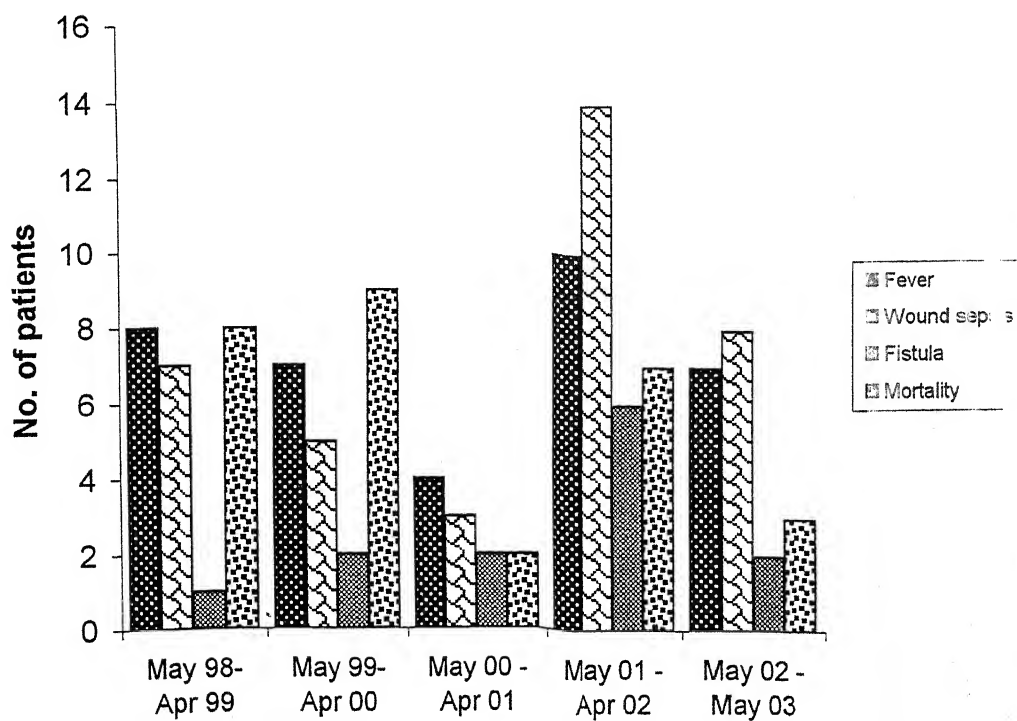
## RADIOLOGICAL FEATURES

TABLE-11

Investigation	No. Of patients	Percentage
Gas under diaphragm in plain X-ray abdomen AP view	133	91.72
Ultrasound	Not done	

- Plain X-ray abdomen (AP view in erect posture) was the most valuable investigation, which showed gas under diaphragm in 91.72% cases.

### Post operative complication and mortality



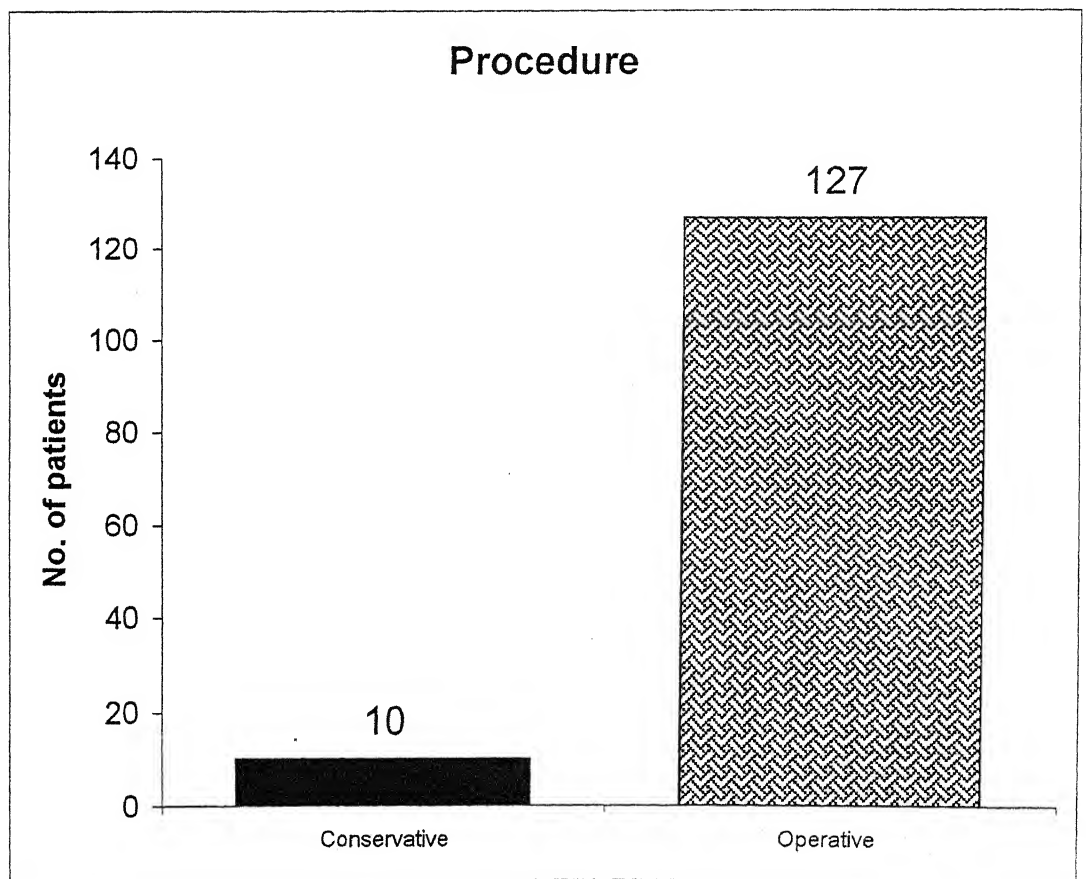
## POST OPERATIVE COMPLICATION AND MORTALITY

**TABLE-12**

Complication	May 98 –		May 99 –		May 00 –		May 01 –		May 02 –	
	Ap 99		Ap 00		Ap 01		Ap 02		May 03	
	n	%	n	%	n	%	n	%	n	%
<b>Fever</b>	8	50.0	7	50.0	4	44.4	10	33.4	7	41.2
<b>Wound sepsis</b>	7	43.7	5	33.8	3	33.4	14	46.6	8	47.0
<b>Fistula</b>	1	6.25	2	14.2	2	22.2	6	20.0	2	11.76
<b>Mortality</b>	8	21	9	27	2	14	7	18	3	9
<b>Total</b>	<b>16</b>	<b>100</b>	<b>14</b>	<b>100</b>	<b>9</b>	<b>100</b>	<b>30</b>	<b>100</b>	<b>17</b>	<b>100</b>

- Most common post operative complication was wound sepsis 26.20% and fever 14.73% cases.
- 8.27% cases had leakage from incision line and turned in to duodenal fistula.
- Among 145 cases in our study 29 patients expired. All the patients who expired had one or two risk factors in the form of ARF, shock and respiratory tract infections.





### **Other complications**

Out of 145 cases studied few patients had systemic complications as follows :

- 8.96% had pulmonary complications.
- 4.8% had renal insufficiency.
- 6.0% had associated cardiac diseases.

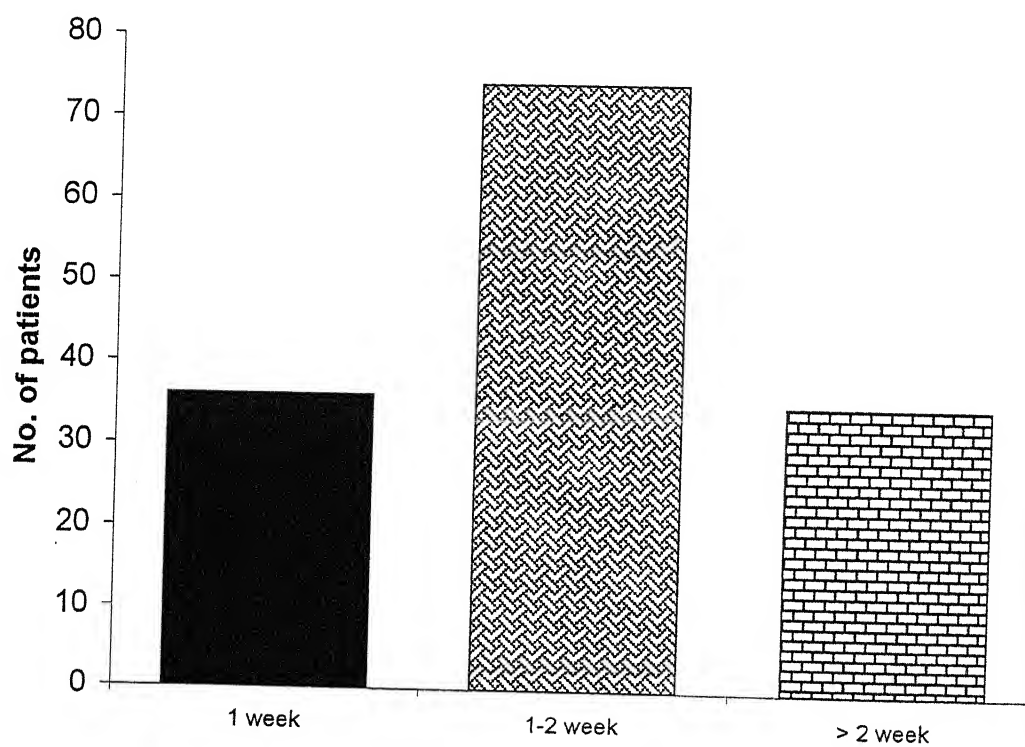
### **PROCEDURE**

**TABLE-13**

<b>Procedure</b>	<b>No. Of patients</b>	<b>Percentage</b>
<b>Conservative</b>	10	13
<b>Operative</b>	127	87
<b>Total</b>	<b>145</b>	<b>100</b>

- In the present study, 87.36% of duodenal perforations were managed by early surgery.
- 12.64% cases were managed conservatively. This was done due mainly to the poor general condition of the patient in the prospective period that were considered as poor candidates for surgery.

**Duration of hospital stay**



## DURATION OF HOSPITAL STAY

**TABLE-14**

Duration	No. Of patients	Percentage
1 week	36	24.82
1-2 week	74	51.04
> 2 week	35	24.14
Total	145	100.0

- Maximum patients were discharged between 1-2 weeks 51.04%.
- 24.82% patients were discharged with in a week from the hospital.
- 24.14% patients stayed in the hospital for more than 2 weeks due mainly to some post operative complication, most common being wound sepsis and fever.

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# DISCUSSION

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## **DISCUSSION**

**Age Incidence :** In the present study of 145 cases, the highest incidence of perforated duodenal ulcer was between 25 to 50 years. 74.48% of total patients fell in this group. A study done on 23 patients at East Birmingham Hospital in 1981-82, showed the mean age at presentation of 56 years. This might be due to the different trends of this entity in the Western countries where the elderly patients are the primary victims. In developing countries like ours the mean age at presentation is early. Various case series in India and abroad have mean age at presentation between 40-60 years.

A study on duodenal perforation on 169 patients in IG Med. College, Shimla in 1983 – 92<sup>1</sup>, showed the mean age at presentation between 41-50 years (29%). This is consistent with that of our study.

A study on duodenal perforation done in JLN Med. College, Ajmer, Rajasthan<sup>2</sup> showed the maximum age incidence between 30-40 years (65%). This figure is again comparable to that of our study. Most of the females patients presented in 25 to 50 years of age group. Only one patient was an elderly lady aged 65 years. This age group is comparable to that of males. None of the female patient was below 25 years of age. Various studies done abroad

confirm that among the female population effected, majority of the victims are elderly ladies and they relate it to increased use of NSAID in this age group<sup>12,4,5,9</sup>. However, in our study most of the females were middle aged.

**Sex Distribution:** In the present study of 145 cases, majority of patients were male 136 (92.4%). Females comprised 7.6% (9 cases). The male female ratio was approximately 15:1.

In our study, it seems that the overall incidence of duodenal perforation in female patients is progressively increasing except in year 01-02 where there is abrupt decrease in this number. Because of the small sample size and short duration over which the study has been done precludes any possible explanation for this.

A study done in IG Med. College, Shimla over a period of 10 years (1983-92) showed male female ratio of 160:9 (17:1). This sex ratio corresponds to that of Bundelkhand region.

A prospective study on 43 patients of duodenal perforation conducted in JLN Med. College, Ajmer (Rajasthan) comprised of all males. There were no female patients in their study. Various other studies conducted abroad confirms the increasing incidence of peptic perforation in females<sup>3-9</sup>.

**H/O smoking:** In our study about 90% patients were smokers, majority of them smoked 1-2 bundles of bidi per day (one bundle consists of 20 Bidis). Although erratic, it seems that the disease incidence is increasing among non smokers. The association of smoking to peptic disease does not need emphasizing. Of nine female patients in our study none were smokers. This relates with the social practice in the Indian Subcontinent where females usually do not smoke. Although there is a strong association of smoking with peptic ulceration, above finding probably point towards the multifactorial etiology of this disease. Though smoking is a strong factor in males but in females it is not so. In our study chronic APD and smoking does not seem to play a role among female patients.

**Family history :** No family history of perforated duodenal ulcer could be elicited from the patients in the present study. The reason might lie in the ignorance of the people about the condition as most of the patients in our study are from rural background.

**Psychological factor :** Only 5 patients gave history of stress. Stress and anxiety is a common entity among the population and being a subjective phenomena, not much reliance can be given to its presence and association with peptic perforation in this region.



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**History of NSAID and steroid intake :** In our study, only 15 patients (10%) confirm the history of drug intake like NSAID and steroids.

In 1965-82, 166 cases of peptic perforation were studied in central hospital Oxford UK<sup>4</sup>. History of NSAID intake was present in only 26 cases (approx 10%), which is comparable to our study. Of 9 female patients presenting with duodenal perforation in our study only one patient gave positive history of drug intake in the form of NSAID. This is contrary to various case series studied abroad where the rising population of female patients have history of drug intake (NSAID). In fact the rising trend in female population in West is explained on this single basis<sup>12,4,5,9</sup>. We could not ascribe a cause for this in our study

**H/O pre-existing disease :** Among 145 cases studied, 42 patients presented with associated medical problems which increased operative risk and mortality. Out of these 42 patients, 15 had history of APD, 7 had respiratory tract infection, pleural effusion, consolidation and tuberculosis. 7 patients were hypertensive.

Eighteen patients of duodenal perforation presenting in emergency had acute renal insufficiency which increased the mortality rate. One patient presented with diabetes. Thus in our

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study, 42 patients had one or two risk factors. They required more efficacious management, less time consuming surgery and intensive post operative care.

In a study done in IG Med. College, Shimla in 1983-92 10.5% patients gave positive history of APD, which is comparable to that of our study (10.34%).

**Symptoms :** The common symptoms of presentation were distention, absolute constipation and epigastric pain 95.17%, 87.8% and 80% respectively. Many of these patients also presented with fever (30.3%) and vomiting (14.44%).

**Signs :** Almost 100% patients had generalized abdominal tenderness and board like rigidity. Masking of liver dullness was present in 87.58%.

In a study conducted at JLN Med. College, Ajmer, Rajasthan, abdominal wall rigidity and guarding were the most common sign present in 93.1% cases.

These findings are comparable to our study where almost 100% had rigidity and tenderness.

Masking of liver dullness was present in 29 cases (67%) out of 43 cases, studied at JLN Med. College, Ajmer<sup>2</sup>.

**Radiological features** : Plain X-ray abdomen (AP view in erect posture) was the most useful investigation which showed gas under diaphragm in 91.72% cases.

Our findings are consistent with other studies done in JLN Med. College, Ajmer<sup>2</sup> and various other studies abroad<sup>9,10</sup>. In 12 patients (8.28%) plain skiagram abdomen in erect view didn't demonstrated free gas under diaphragm.

The demonstration of a pneumoperitoneum following a perforated viscus is however not invariable and most series show that in only 75-80% of perforations is free gas demonstrable<sup>45</sup>. A number of reasons for this have been suggested including :

- 1) Sealing of perforation.
- 2) Lack of gas at the site of perforation.
- 3) Adhesions around the site of perforation.
- 4) Faulty technique.

However radiographic technique and positioning is also important and it is recommended that a patient should be in position for 10 minutes prior to film being taken, for it takes this time for free gas to rise to highest point in the abdomen. However, this is not possible practically in abdominal catastrophe like duodenal perforation and is seldom practiced by the radiologists.

If a left lateral decubitus projection is included, this yield can be increased upto 90%, which is similar to the sensitivity of ultrasound to demonstrate pneumoperitonium.

**Post operative complications :** Most common post operative complication in our study was wound sepsis and fever (26.20% and 14.73% respectively).

8.27% patients had leakage from incision line and later turned into duodenal fistula. 4.2% had wound dehiscence.

Wound complications in the form of sepsis and dehiscence had been the most common complications in various studies done in India and abroad<sup>1,2,4,5,10</sup>.

In a study conducted In IG Med College, Shimla<sup>1</sup> wound complication accounted for 55% of the cases. It was 25% in a similar study done at Ajmer<sup>2</sup>.

**Mortality :** Our of 145 patients in our study, 29 patients expired (20%). All the patients who expired had one or two risk factors in the form of shock, ARF or respiratory complications. Maximum patients died in year 99-2000 (9 patients) for the reasons unknown.

Mortality rates vary much in various studies performed in India and abroad ranging from 2.3% to 15%<sup>1,2,4,5,6,8,9,10</sup>.

The mortality was maximum in patients who were treated conservatively accounting for 77.8% in a cases series of 166 patients studied at central Hospital, Oxford (UK)<sup>4</sup>. This dictates the advantage of early surgery in these patients however with increased better post operative care and better availability of resources mortality is showing a constant downhill course.

Although conservative management for peptic perforation had been described in literature in various case series<sup>19</sup> but early operative intervention undoubtedly had remained the preferred option for management of these patients<sup>4,8,10</sup>.

**Total hospital stay :** The average hospital stay was between 1-2 weeks (51.03%). Maximum patients were discharged between 8-10 days. This is comparable to a study done at JLN Medical College, Ajmer<sup>2</sup> where the average duration of hospital stay was 12-15 days.

24.82% patients were discharged with in a week.

24.13% patients stayed for over 2 weeks in the hospital. This was mainly because of postoperative complications, most common of them being wound sepsis and fever.

**Other systemic complications :** Out of the total 145 cases studied only a few developed systemic complications.

8.96% had pulmonary complications like pleural effusion, 48 had renal problem and 6 patients had cardiac problem. None of the patients developed gastric outlet obstruction.

**Procedure :** In 145 cases studied, 13 patients were managed conservatively. This was mainly done due to presence of operative risk and poor general condition of the cases presented. Early surgery was the option preferred in all except the moribund and extremely ill patient who were considered poor candidates for surgery. Such patients were managed by placing a drain in pelvic cavity along with Ryles tube aspiration and appropriate antibiotics. 87.36% patient were managed by early operative intervention.

Although conservative management for peptic perforation had been described in literature in various case series<sup>5,19,49-51</sup>, but early operative interventions undoubtedly had remained the preferred option for management of these patients.

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# CONCLUSION

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## **CONCLUSION**

1. Commonest age of perforation of duodenal ulcer in Bundelkhand region was between 25-50 years.
2. Male : Female ratio was 15:1.
3. Almost 90% of cases were smokers. All female patients in our study were non smokers.
4. Family history could not be elicited in any of the patient.
5. Only 3.44% cases gave history of stress and anxiety.
6. History of drug intake was present in only about 10% cases.
7. Pre-existing diseases were present in 33 cases out of 145.
  - 4.82% had respiratory problems like ARI, COPD and pleural effusion.
  - 4.82% were hypertensive
  - 22.7% had acute renal insufficiency
  - 0.68% had diabetes mellitus.
8. Commonest symptoms of presentation were pain in abdomen, absolute constipation and abdominal distention.
9. Most common signs were abdominal distension, board like rigidity and tenderness.
10. Most significant sign of duodenal perforation was masking of liver dullness present in 87.58% cases.



11. Gas under diaphragm in plain X-ray abdomen AP view erect posture was very significant finding of perforation (91.72%).
12. Most common post operative complications were wound sepsis (26.20%) and fever (14.72%).
13. The average hospital stay was between 1-2 weeks.
14. Mortality was 20%, most of the patient who expired preoperatively had one or more risk factor.
15. Systemic post operative complication occurred in only those patient who were extremely ill in the preoperative period.
16. Graham's repair was commonest procedure done (in 87.36% cases).

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# **BIBLIOGRAPHY**

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## **BIBLIOGRAPHY**

1. Peptic perforation : IJS (1991), 53(6), 251-3.
2. Vagotomy and pyloroplasty in perforated duodenal ulcer- a retrospective analysis. IJS (94), 56(1), 12-20.
3. Duodenal ulcer perforation while on cimetidine therapy. BJS 1984, 71 Aug : 586-88.
4. What has happened to perforated peptic ulcer. BJS 1984, 17 Oct 774-76.
5. Peptic perforation. Analysis of 246 cases. Aust N2J Surg 1977: Feb 47(2) : 81-85.
6. Time trends in patients and disease characteristics – perforated peptic ulcer over 56 yrs. (1935-90).
7. Incidence of perforated ulcer in western Norway between 1935-90. Time trends. Ant J Epidemiol : 1995.
8. A descriptive longitudinal study in cases of gastro duodenal perforation over a period of one year (1999-2000) at Belgam. IJS 146(5) : 635-39.
9. Recent trends in admission and mortality due to peptic ulcer in Enlgand. Oct 2002 : 50; 460-64.

- 
10. Non operative management of perforated peptic ulcer. Pak J Med Sci 2003; 19(2) : 101-05.
  11. Irvin TT : Mortality in perforated peptic ulcer – a case of risk stratification in elderly patients. Br J S 1989. Mar 76; 215-8.
  12. Kalpesh Jani, AK Saxena : Management of large size duodenal peptic perforation by omental plugging : A new technique. IJS Vol 62, Nov 2, 2000.
  13. Svanes C, Salvesen H : Espenhaug B et al : A multifactorial analysis of factors related to Lethality after treatment of perforated duodenal ulcer. Ann Surg 1989. 209 : 418.
  14. Michael Matsuda et al : perforated pyloroduodenal ulcer : Long term results with omental patch closure and parietal cell vagotomy. Ann Surg 1995, Vol 221. No. 5.
  15. Bailey & Love : Short practice of surgery. 23<sup>rd</sup> edition, p-911.
  16. Christopher Haslett, Edwin R, Chilvere, John A, A Hunter, Nicholes A, Boon, Davidson's : Principles and practice of Medicine, 16<sup>th</sup> Ed : 631-638.
  17. RCG Rusell, Normans, William's and Christopher JK, Bulstrode Bailey and Love's Short Practice of Surgery, 23<sup>rd</sup> edition : 891-914.

- 
18. Brawnwald, Fauci, Kasper, Hauser Longo, Jonson, Harrison's : Principle of Internal Medicine, Vol-2 (1607-09).
  19. Wangsteen SL et al : Non-operative treatment of localised perforation of duodenal. Am J Surg 1972, 123 : 538-42.
  20. Hugh TB : Perforated peptic ulcer in Schwartz Ellis HA. Eds. Maingot's abdominal operations. 9<sup>th</sup> edition. 1990: 627-45.
  21. Jordan PH Jr, Thereby J : Should it be PGV or selective vagotomy for treatment of duodenal ulcer – A progress report. Ann Surgery 1987, 205 : 572-90.
  22. Tanhiphat C et al : Surgical treatment of perforated duodenal ulcer : prospective trial between simple closure and definitive Surgery. BJS, 1985, 72 : 370-72.
  23. McDonough JM & Foster JM : Factors influencing prognosis in perforated peptic ulcer. AM J Surg, 1972, 123 : 411-16a.
  24. Taylor H et al : Perforated peptic ulcer treated without operations. Lancet 2, 1946 : 447.
  25. Taylor H : Non surgical treatment of perforated peptic ulcer. Gastroenterology 1957, 33: 353.
  26. Smith L, Beehan PJ : Definitive operations for perforated duodenal ulcers. Surg Gyne Obst 1969, 129 : 325-30.

27. Simpson CJ et al : Effect of cimetidine on prognosis of simple closure of perforated duodenal ulcer. Br J S, 1987, 74 : 104.
28. Boey J Lee NW et al : Immediate definitive surgery for perforated duodenal ulcers. Ann Surg 1982, 196 : 338.
29. Adarzi et al : Laparoscopic omental patch repair of perforated duodenal ulcer with an automated stapler. BJS Vol 80, 1993.
30. Boey John et al : A prospective study of operative risk factors in perforated duodenal ulcers. Ann Surg 1982; 265-69.
31. Boey John et al : Risk stratification in perforated duodenal ulcer; A prospective validation of risk factors. Ann Sur 1987; 22-26.
32. Mark JBD et al : Factors influencing the treatment of perforated duodenal ulcer. Surg Gyn Obst 1969, 129; 325-230.
33. L Sawyer MD, J Lynwood, Heerington Jr, MD Joseph, L Milherin : Acute perforated duodenal ulcer. An evaluation of Surgical management. Arch Surg. Vol 110 May 1975.

34. Bornmann PC and Theodoron NA : Simple closure of perforated duodenal ulcer prospective evaluation of conservative management policy. BJS, 1990; 77: 73.
35. Playworth MJ and McMohan MJ : Indications for simple closure of perforated duodenal ulcers. BJS, 1978, 65 : 699.
36. Graham RR : Treatment of perforated duodenal ulcer. Surg Gyn Obst 1937, 64: 235-238.
37. Cellan Jones : A rapid method of treatment in perforated duodenal ulcer. BMJ 1929, 1 : 1076.
38. Christine F, Kollmorgen et al : Proximal gastric vagotomy – Comparison between open and laparoscopic method. Ann Surg Vol 224, No. 1; 1996.
39. Kohli et al : A study of 93 cases of peptic perforation by simple closure. IJS (86), 28, 511-13.
40. Canevira R et al : Simple closure with or without PGV for perforated duodenal ulcer. BJS (1986) : 76; 427-30.
41. Jordan GL Jr et al : Surgical management of perforated peptic ulcer. Ann Surg 1979, 197: 628-33.

- 
42. Swayers JL and Harrington JL Jr : Perforated duodenal ulcer managed by PGV and suture application. Ann Surg 1977, 85: 160-66.
  43. Jordan GL, De Bailey ME L Surgical management of perforated peptic ulcer. Ann Surg 1974 : 179 : 628-33.
  44. Masao Matsuda et al : Laparoscopic omental patch repair for perforated peptic ulcer. Ann Surg, 1995, Vol 211, No 3.
  45. The acute abdomens – abdominal trauma. Text book of Radiology& Surgery. P-919.
  46. Boey J et al : Risk stratification is perforated duodenal ulcer : A prospective variation of risk factors. Ann Surg 1987 : 22-26.
  47. Cotran, Kumar, Robbins : Pathologic basis of diseases . 5<sup>th</sup> edition. 767-778.
  48. Cellan Jones : A rapid method of treatment in perforated duodenal ulcer. BMJ, 1929, 1: 1076.
  49. Bornmann PC and Theodoron NA : Simple closure of perforated duodenal ulcer. Prospective evaluation of conservative management policy. BJS, 1990, 77: 73.



50. Taylor H et al : Perforated peptic ulcer treated without operation. Lancet 2. 1946 : 447.
51. Taylor : Non surgical treatment of perforated peptic ulcer,. Gastroenterology, 1957, 33: 353.
52. Chrinstine F, Kollmorgan et al : PGV comparison between open and laparoscopic method. Ann Surg Vol 224, No. 1 ; 1996.
53. Brawnwald Fauci, Kasper, Hauser, Loongo, Harrison's principle of Internal Medicine, Vol 2 (1607-09).